THE CHINESE UNIVERSITY OF HONG KONG

Micro-Module Courseware Development Grant

Final Report (August 2015)

Report due 31 August 2015.
Please return by email to The Ad hoc Committee on Planning of eLearning Infrastructure
mmcd@cuhk.edu.hk

PART I

Project title: **Programming Hands on Practice for Foundation-Year Students**
Principal supervisor: **Dr. WONG Tsz Yeung**
Department / Unit: **Department of Computer Science and Engineering**
Project duration: From January 2015 to August 2015
Date report submitted: **August 31, 2015**

1. Project objectives

The objective of this project is to allow every foundation year students accessing web-based lectures for the course *ENGG1110 – Problem Solving by Programming*. Instead of filming a series of 45-minute long lecture-based videos, each topic will be well formatted into a series of 5-10 minutes long micro modules.

On the other hand, we would like to evaluate how well students have learnt from the videos, we **create a companion online questionnaire** as a short test for students over the concepts in the micro-modules.

2. Process, outcomes or deliverables

From 2015 January – March, we spent our efforts in producing micro-modules using a purchased Macbook Pro with the de-facto software *ScreenFlow*. We have reported in the interim report that we have experimented in hosting 4 videos on YouTube.

In 2015 summer, instead of producing videos, we spend all our efforts in implementing the online platform. The URL is:

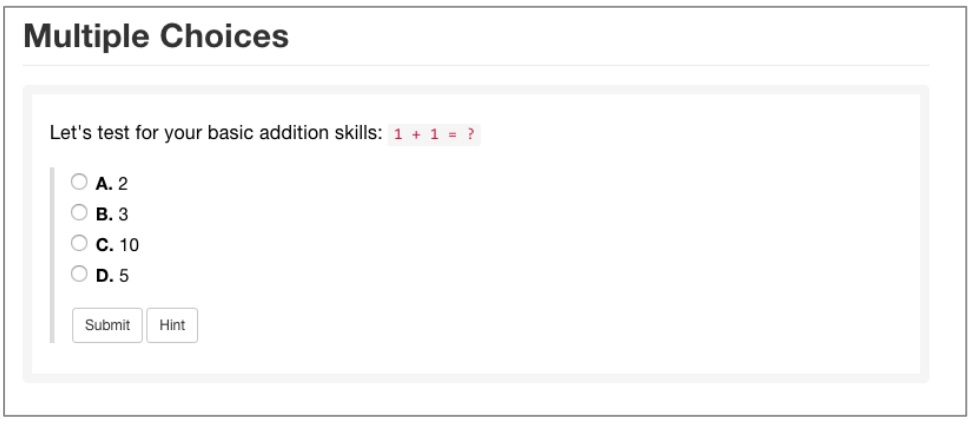
http://tywong.github.io/gitbook-estr1002/

This is a great success. We list out the outcome as follows.

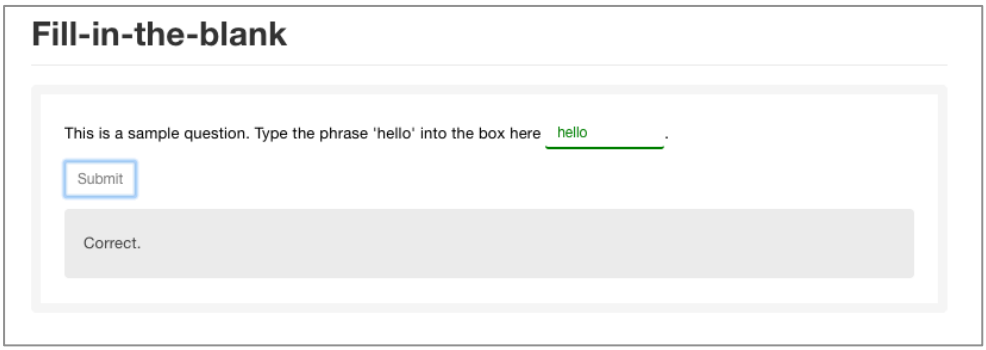
- **Online book for the modules.** In the PI's opinion, the videos alone are not enough. Therefore, we build an online book for each modules using an open-source software

called GitBook (https://www.gitbook.com/). It is an open-source project, and therefore it is perfectly fine for us to use it in our project.

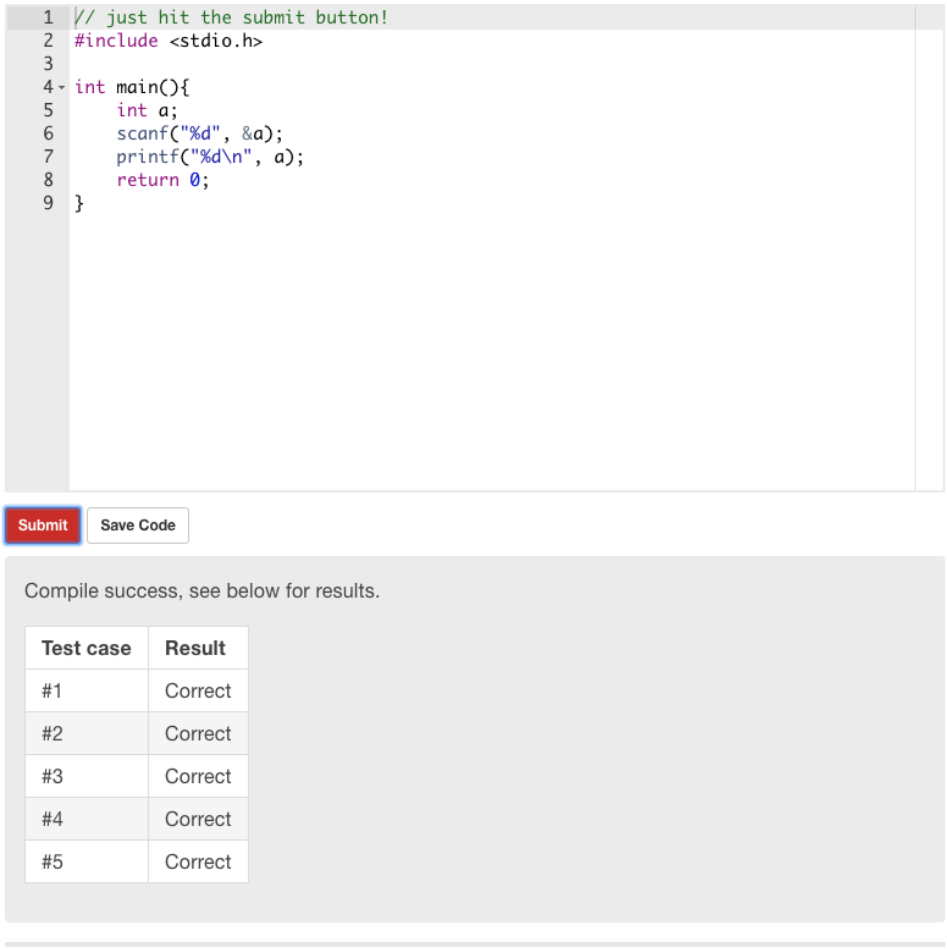
- **Online quizzes.** We have extended the open-source GitBook project in order to provide the following kinds of online quizzes.
    - **Multiple-choice questions:**



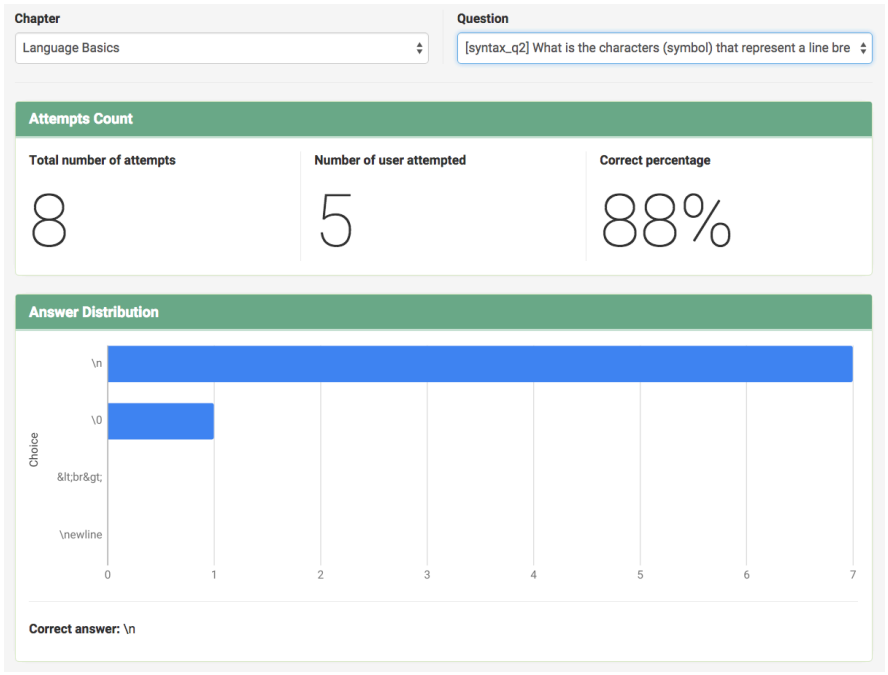
    - **Fill-in-the-blank questions:**



    - **Coding questions:** the coding question spent us the most time because we have to construct a safe sandbox for running the codes. For the information of the committee, we are using open-source technology called Docker (http://docker.io/) to construct the sandbox.



- **Data collection system.** When a student has attempted a question, we will save the attempts they made so that teachers can observe their performance. As we respect students' privacy, we only track the aggregated performance of each question, instead of tracking individual students.



3. Evaluation Plan

In our original proposal, we decided to have a pilot run of all our implementations in 2015 Sep – Dec. The PI is building the content of the online book and will deploy the system in the course ESTR 1002 (The ELITE version of the course ENGG 1110). The course size of ESTR 1002 is small and we can closely monitor how students use the book system.

4. Dissemination, diffusion and impact

The major contribution of this project is the online book system. We have developed a unified, clean, and beautiful system to host course materials.

In the process of developing the online book, we have developed several plugins for the GitBook system. Since GitBook is an open-source system, we open source our plugins in order to support the growth of the GitBook community.

All the open-source plugin are hosted under the URL: https://www.npmjs.com/~ymcatar

All plugins have attracted downloads from the communities. One of our plugins have attracted ***thousands of downloads***! We consider this as a solid impact to the community. On top of that, we also received bug reports and feature requests from the community.

Referring back to our book system, since its developed was just completed by the end of the project. It is hard to say its impact. Nevertheless, we will spread its use to other courses taught by the PI.

PART II

Financial data

Funds available:

Funds awarded from MMCDG	$	88,000.00
Funds secured from other sources (please specify_____)	$	0.00
Total:	$	88,000.00

Expenditure:

Item	Budget as per application	Expenditure	Balance
Hardware - Macbook Pro	$11,488.00	$12,081.00	$75,919
Software – ScreenFlow	$780.00	$700.00	$75,219
Hardware – NAS with HDD	-	$7,083.00	$68,136
Software – Parallel Desktop	-	$598.00	$67,538
Hardware – Microsoft Surface Pro 3	-	$8,376.00	$59,162
Software – Camtasia	-	$1,432.00	$57,730
Hardware – LiveScribe 3	-	$1,798.00	$55,932
Manpower – 2 Junior Research Assistants (2 months)	$72,000.00	$45,320.00	$10,612
Manpower – 2 summer student helpers	-	$7,000.00	$3,612
Hardware - Wacom Cintiq 13HD	$8,400.00	$0.00 (not useful)	$3,612
Total:	$92,668.00	$84,388.00	$3,612

Justifications for items not included in applications

- **NAS with HDD** – PI has found that the produced videos are much bigger than expected. An extra storage device is needed for keeping the raw videos as well as the produced video files.

- **Parallel Desktop** – PI has a need to run other operating systems (such as Linux OS) on the Macbook Pro. The Parallel Desktop software is therefore purchased.

- **Microsoft Surface Pro 3 & Camtasia** – PI has to produce videos capturing the screens of Microsoft Windows (more specifically, capturing how Visual Studio works). Therefore, both the hardware and the software are purchased.

- (**Wacom Cintiq 13HD**) – Originally, it is for capturing hand-writing annotation. But, the PI found that Microsoft Surface Pro 3 is more superior. Therefore, this item is not purchased.

- **LiveScribe 3** – The PI found that this is a great tool in capturing paper-writing lectures into a video ***automatically***. The PI found that it is a good purchase.

- **Summer Student Helper** – Since it is hard to find students working on the project for three months, student helpers were hired instead.

PART III

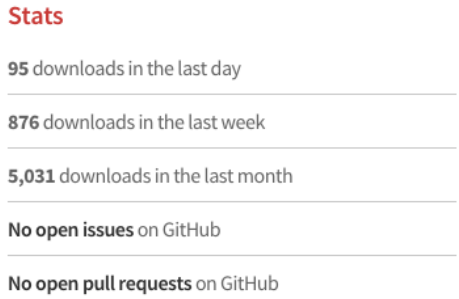
Lessons learnt from the project

In the development process, we understand that the book system is more important than the video itself. It is because we can provide a place for students to verify their knowledge learnt as well as a place for us to collect their activities and feedbacks. That is why we developed an online book using open-source technologies.

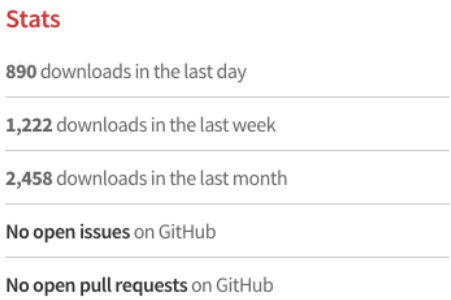
Some components of our online book are open-sourced. They are well received by the online community. E.g.,

https://www.npmjs.com/package/gitbook-plugin-sectionx

This plugin receives ***thousands of downloads*** every month since we released it in 2015 June. We believed that we have ***made the right investment*** in writing an online book.



Number of downloads by the end of 2015 July.



Number of downloads by the end of 2015 August.

Last but not least, it is encouraging that this project has transformed two engineering first-year students (the hired junior RAs) from JavaScript newbies into indie JavaScript programmers, having projects with thousands of downloads.

PART IV

Information for public access

Summary information and brief write-ups of individual projects will be uploaded to a publicly accessible CUHK MMCDG website. Please extract from Part I the relevant information to facilitate the compilation of the publicly accessible website and reports.

1. Keywords

Please provide five keywords (in the order of most relevant to your project to least relevant) to describe your micro-modules/pedagogies adopted.

(Most relevant) Keyword 1: Online book

Keyword 2: MOOC system

Keyword 3: Integrated Course Website

Keyword 4: Programming

(Least relevant) Keyword 5: Micro modules

2. Summary

Please provide information, if any, in the following tables, and provide the details in Part I.

Table 1: Publicly accessible online resources (if any)
(a) **Project website:** *NIL*
(b) **Webpage(s):** http://tywong.github.io/gitbook-estr1002/
(c) **Others (please specify):**

Table 2: Resource accessible to a target group of students (if any)

If resources (eg. software) have been developed for a target group of students (eg. in a course, in a department) to gain access through specific platforms (eg. Blackboard, facebook), please specify.

Course Code/ Target Students	**Term & Year of offering**	**Approximate No. of students**	**Platform**
ESTR 1002	Term 1, 2015-16	20	Custom platform

Table 3: Presentation (if any)	
Please classify each of the (oral/poster) presentations into one and only one of the following categories	**Number**
(a) In workshop/retreat within your unit (eg. department, faculty)	*0*
(b) In workshop/retreat organized for CUHK teachers (eg. CLEAR workshop, workshop organized by other CUHK units)	*1*
(c) In CUHK ExPo jointly organized by CLEAR and ITSC	*0*
(d) In any other event held in HK (eg. UGC symposium, talks delivered to units of other institutions)	*0*
(e) In international conference	*0*
(f) Others (please specify)	*0*

Table 4: Publication (if any)	
Please classify each piece of publications into one and only one of the following categories	**Number**
(a) Project CD/DVD	*0*
(b) Project leaflet	*0*
(c) Project booklet	*0*
(d) A section/chapter in a booklet/ book distributed to a limited group of audience	*0*
(e) Conference proceeding	*0*
(f) A chapter in a book accessible internationally	*0*
(g) A paper in an referred journal	*0*
(h) Others (please specify) Open-source repository: https://www.npmjs.com/~ymcatar	*1*

3. A one-page brief write up

Please provide a one-page brief write-up of no more than 500 words or a short video (~2 minutes) (preferred).

This project is to develop an integrated platform to host videos as well as online question banks. We have developed an open-source, online book system. This system is capable of:

- Hosting book chapters written in the language called Markdown (https://en.wikipedia.org/wiki/Markdown);

- Displaying YouTube videos that are embedded in the book chapters.

- Hosting online quizzes of three different forms:

    - Multiple choice questions;
    - Fill-in-the-blank questions;
    - Coding questions.